OCT 1990

FLOOD INSURANCE STUDY

CITY OF PAINTSVILLE, KENTUCKY
JOHNSON COUNTY

REVISED:
NOVEMBER 2, 1990

Federal Emergency Management Agency

COMMUNITY NUMBER - 210127

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision (LOMR) process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial Flood Insurance Study Effective Date: November 15, 1979

Flood Insurance Study Revised: November 2, 1990

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1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Paintsville, Johnson County, Kentucky, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were obtained from the Flood Insurance Study for the unincorporated areas Johnson County, Kentucky.

1.3 Coordination

On November 25, 1975, the City of Paintsville was notified by FEMA of the initiation of a Flood Insurance Study for the community.

On September 20, 1989, a final Consultation and Coordination Officer's (CCO) meeting was held with representatives from FEMA and the city to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Paintsville, Johnson County, Kentucky. The area of study is shown on the Vicinity Map (Figure 1).

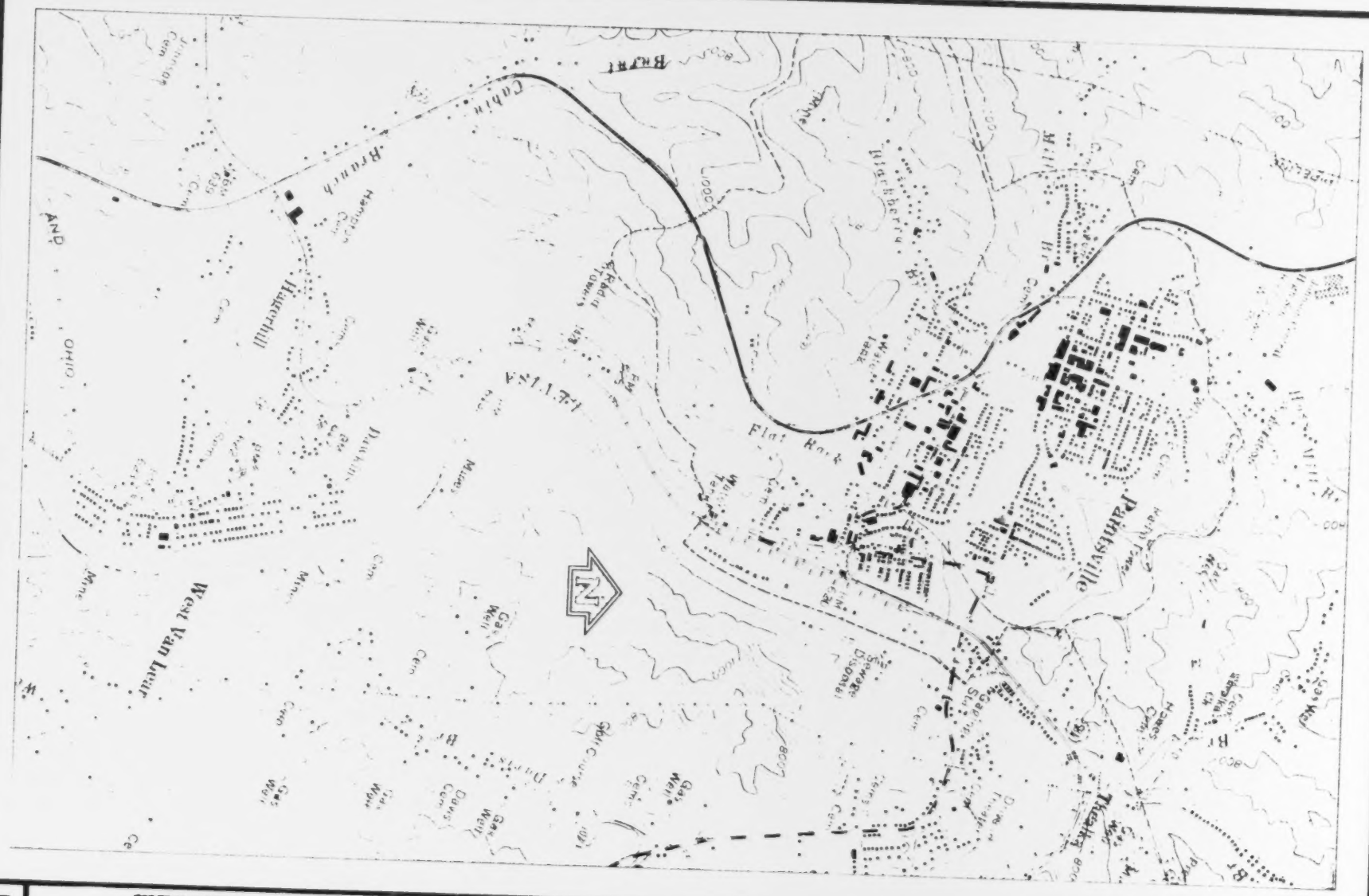


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PAINTSVILLE, KY

(JOHNSON CO.)

APPROXIMATE SCALE

2000 0 2000 4000 6000 FEET

VICINITY MAP

Levisa Fork and Paint Creek were studied by detailed methods for their entire lengths within the community. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction.

2.2 Community Description

The City of Paintsville, which is the county seat, is located in the eastern portion of Kentucky. It is situated approximately 180 miles east of Louisville, 186 miles southeast of Cincinnati, Ohio, and 283 miles northeast of Knoxville, Tennessee. Paintsville is surrounded entirely by the unincorporated areas of Johnson County.

The terrain in Paintsville is mainly flat near the middle of town with hilly areas being located near the northern and southern corporate limits. Approximately 80 percent of all commercial and residential development lie within the Levisa Fork and Paint Creek floodplains.

2.3 Principal Flood Problems

Floods can occur in Johnson County during any season of the year. They can result from periods of general rainfall over the entire area to short intense periods of localized thunderstorms common to the region. The highest recorded flood in Paintsville occurred in February 1862 when Levisa Fork reached an elevation of 613.44 feet as indicated by high-water marks. In recent years, gage records at Paintsville gage (river mile 38.32) showed that Levisa Fork reached a stage of 45.92 feet on January 31, 1957.

2.4 Flood Protection Measures

There are five upstream flood control reservoirs on Levisa Fork that help to reduce flood levels in the community. These projects were constructed by the COE. Dewey Lake has been regulated since May 1950 and is located on Johns Creek in Floyd County, Kentucky, approximately 52.6 miles above the mouth of Levisa Fork. Fishtrap Lake has been regulated since October 1968 and is located on Levisa Fork in Pike County, approximately 103.3 miles above the mouth of Levisa Fork. John W. Flannagan Dam and Reservoir has been regulated since March 1965 and is located on the Pound River approximately 123.2 miles above the mouth of Levisa Fork in Dickenson County. North Fork of Pound Lake has been regulated since August 1966 and is located of the North Fork of Pound River in Wise County, approximately 157.2 miles above the mouth of Levisa Fork. Paintsville Lake has been regulated since May 1984 and is located 8 miles above the mouth of Paint Creek and 4 miles west of Paintsville. This study reflects the reductions in flood heights attributed to these reservoirs.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting the community.

The natural discharge-frequency curves used in this study were developed previously on a regional basis in accordance with the method outlined in Leo R. Beard's Statistical Methods in Hydrology and U. S. Geological Survey (USGS) Bulletin 17B (References 1 and 2). Twenty USGS stream gaging stations in Levisa Fork, Big Sandy River, and surrounding basins displaying similar hydrologic characteristics were used in the analyses (Reference 3).

A summary of the drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
LEVISA FORK					
At stream mile 24.740	2,225	56,000	69,200	76,000	97,800
At stream mile 31.309	2,170	40,000	53,300	59,800	77,800
At stream mile 43.118	2,000	39,400	54,900	63,600	64,900

TABLE 1 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
PAINT CREEK					
At stream mile 1.306	165	6,910	10,660	12,430	16,660
At confluence with Levisa Fork	165	4,400	8,900	11,500	19,700

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross sections for the backwater analysis for the streams studied by detailed methods were obtained using topographic maps compiled from aerial photographs at a scale of 1:2,400 with a contour interval of 5 feet (Reference 4). All bridges and culverts in the community were field surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the Flood Insurance Rate Map (Exhibit 2).

Water-surface elevations of floods of the selected recurrence intervals were computed using the COE HEC-2 step-backwater computer program (Reference 5). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. Starting water-surface elevations for Levisa Fork were taken from the Flood Insurance Study for the unincorporated areas of Lawrence County (Reference 6). Starting water-surface elevations for Paint Creek were determined using the slope/area method.

Channel roughness coefficients (Manning's "n") used in the hydraulic computations were determined on the basis of characteristics of historical floods in the county and existing floodplain conditions. For Levisa Fork, the channel "n" values ranged from 0.041 to 0.044, and the overbank "n" values ranged from 0.063 to 0.080. For Paint Creek, the channel "n" values ranged from 0.060 to 0.075, and the overbank "n" value was 0.080.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps; the descriptions of the marks are presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the streams studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:2,400 with a contour interval of 5 feet (Reference 4).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zone AE), and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the

100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as a minimum standard that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 2). The computed floodways are shown on the Flood Insurance Rate Map (Exhibit 2). In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway widths for Levisa Fork extend beyond the corporate limits.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 2 for certain downstream cross sections of Paint Creek are lower than the regulatory flood elevations in that area, which must take into account the 100-year flooding due to backwater from other sources.

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Levisa Fork								
A	37.030	301/245[2]	12,418	4.9	612.6	612.6	613.5	0.9
B	37.240	291/180[2]	12,239	5.0	612.8	612.8	613.7	0.9
C	37.442	271/185[2]	11,361	5.4	613.0	613.0	613.9	0.9
D	37.677	327/210[2]	12,552	4.9	613.3	613.3	614.2	0.9
E	37.903	295/170[2]	13,583	4.9	613.6	613.6	614.5	0.9
F	38.096	389/238[2]	14,309	4.3	613.9	613.9	614.8	0.9
G	38.360	356/258[2]	14,568	4.2	614.1	614.1	615.0	0.9
H	38.476	450	18,002	3.4	614.4	614.4	615.4	1.0
I	38.588	370/160[2]	13,497	4.6	614.4	614.4	615.4	1.0
J	38.801	299/104[2]	11,150	5.5	614.4	614.4	615.4	1.0
K	39.021	279/84[2]	11,413	5.4	614.7	614.7	615.7	1.0
L	39.171	294/69[2]	12,714	4.8	614.9	614.9	615.9	1.0

[1]Miles above confluence with Big Sandy River
[2]Width/width within corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PAINTSVILLE, KY

(JOHNSON CO.)

FLOODWAY DATA

LEVISA FORK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Paint Creek								
A	0.121	209	2,570	4.5	614.0[2]	591.9	592.7	0.8
B	0.185	232	3,149	3.7	614.0[2]	592.2	593.1	0.9
C	0.281	107	2,032	5.7	614.0[2]	592.2	593.1	0.9
D	0.367	139	2,023	5.7	614.0[2]	592.6	593.5	0.9
E	0.623	180	2,977	3.9	614.0[2]	593.9	594.9	1.0
F	0.888	91	1,869	6.2	614.0[2]	594.7	595.6	0.9
G	1.040	119	2,317	5.0	614.0[2]	595.9	596.8	0.9
H	1.110	119	2,261	5.1	614.0[2]	596.5	597.3	0.8
I	1.306	169	2,837	4.4	614.0[2]	606.1	606.1	0.0
J	1.403	335	5,370	2.3	614.0[2]	606.5	606.5	0.0
K	1.450	295	5,613	2.2	614.0[2]	606.7	607.7	1.0
L	1.611	288	5,102	2.4	614.0[2]	606.9	607.9	1.0
M	1.924	417	5,180	2.4	614.0[2]	607.3	608.3	1.0
N	2.178	461	6,623	1.9	614.0[2]	607.7	608.7	1.0
O	2.406	213	3,596	3.5	614.0[2]	607.9	608.9	1.0
P	2.683	326	5,210	2.3	614.0[2]	608.5	609.4	0.9
Q	2.840	304	4,909	2.4	614.0[2]	608.7	609.6	0.9

[1]Miles above confluence with Levisa Fork
[2]Elevation computed without consideration of backwater effects from Levisa Fork

TABLE 2

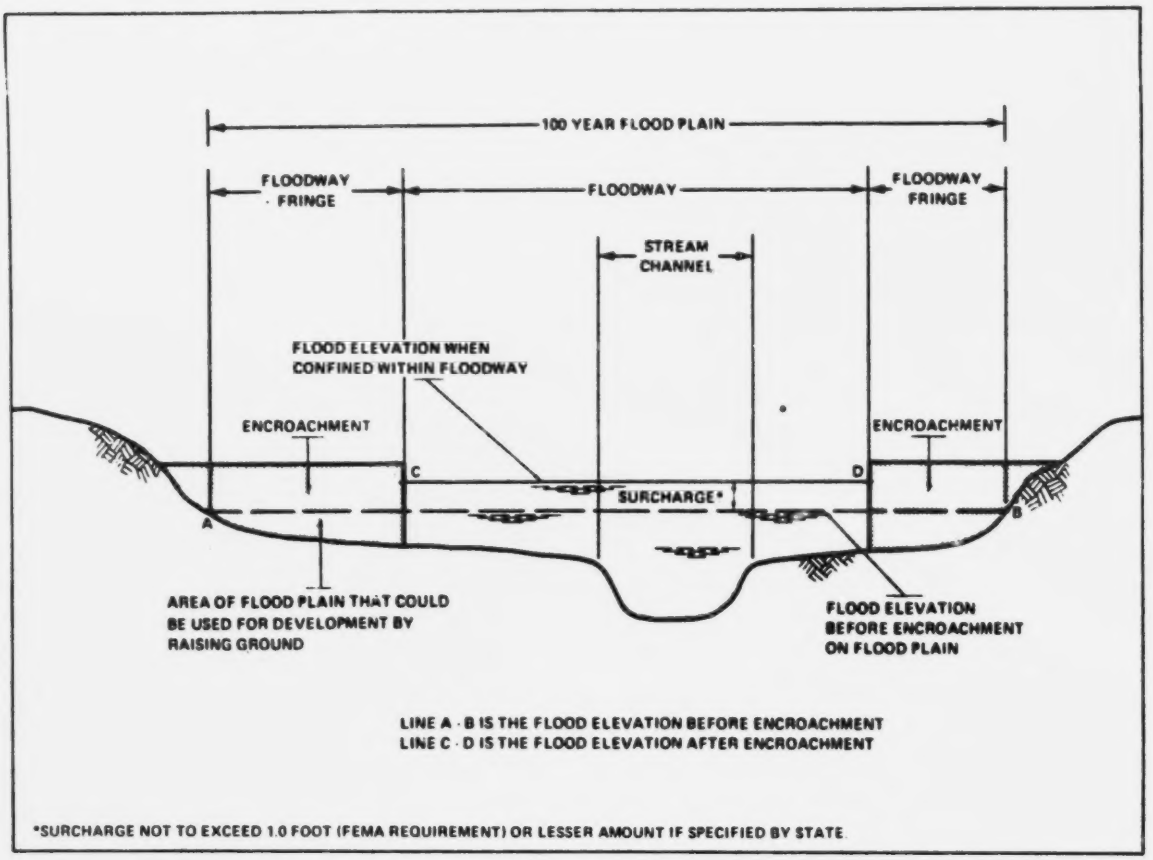
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PAINTSVILLE, KY

(JOHNSON CO.)

FLOODWAY DATA

PAINT CREEK


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FLOODWAY SCHEMATIC Figure 2

Zone AE - continued

Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain,and to areas of 100-year flooding where average depths are less than 1 foot, areas of 10-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

7.0 OTHER STUDIES

A Flood Insurance Study for the unincorporated areas of Johnson County has been prepared (Reference 7). The results of this study are in complete agreement with the results of that study.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, 1371 Peachtree Street, Northeast, Suite 700, Atlanta, Georgia 30309.

9.0 BIBLIOGRAPHY AND REFERENCES

1. Leo R. Beard, Statistical Methods in Hydrology, Sacramento, California, U. S. Army Corps of Engineers, January 1962.

2. U. S. Department of the Interior, Geological Survey, Office of Water Data Collection, Interagency Advisory Committee on Water Data, "Guidelines for Determining Flood Flow Frequency," Bulletin 17B, Reston, Virginia, Revised September 1981.

3. U. S. Department of the Interior, Geological Survey, Water Supply Paper of Kentucky, Reston, Virginia, 1985.

4. Photo Science, Inc., Topographic Maps compiled from aerial photographs, Kentucky Coordinate System, South Grid Zone, Scale 1:2,400, Contour Interval 5 Feet: Johnson County, Kentucky, March 15, 1980, and March 26, 1985.

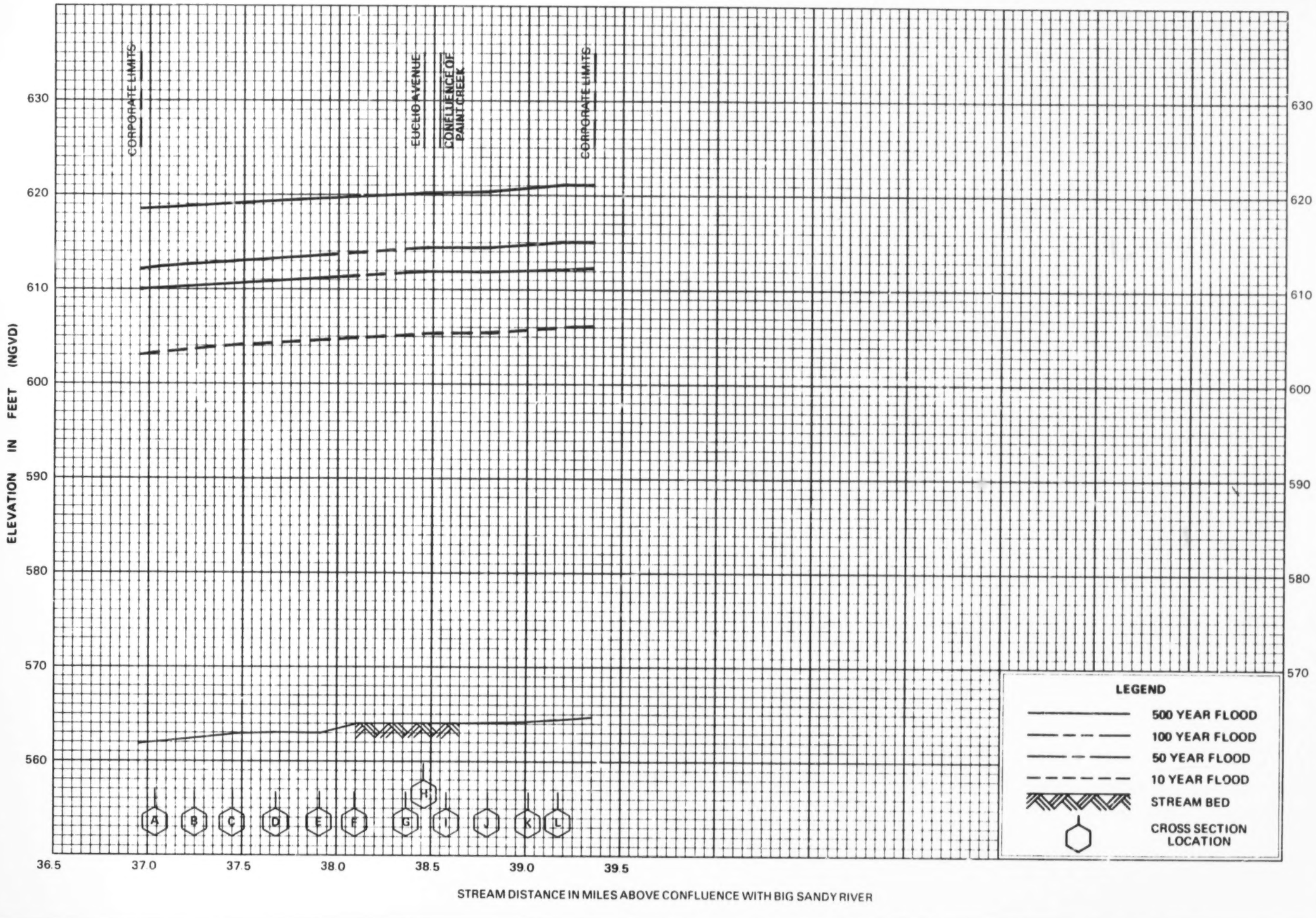
5. U. S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Generalized Computer Program, Davis, California, September 1982.

6. Federal Emergency Management Agency, Flood Insurance Study, Unincorporated Areas of Lawrence County, Kentucky, Washington, D. C., April 17, 1984.

7. Federal Emergency Management Agency, Flood Insurance Study, Unincorporated Areas of Johnson County, Kentucky, Washington, D. C., May 4, 1988.

EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	Elevation (Feet NGVD)	Description of Location
RM 1	618.92	Bench is located 600 feet east of intersection of U. S. Highways 460 and 23 on southeast corner of Highway 23 and 460 bridge over Paint Creek. Square cut, TBM FFV-S 80-A.
RM 2	611.30	Standard disk stamped U 85 1935 and set flush in concrete post at northwest corner of County Courthouse yard, 12 feet northeast of World War I Memorial, approximately level with the sidewalks of Second and Court Streets.
RM 3	614.48	Standard disk stamped KY 614 at north wall of County Courthouse, 3 feet east of northwest corner, 16 feet west of west edge of steps at north entrance to building, in second stone block, from bottom, 2 feet above ground.
RM 4	614.59	Standard disk stamped V 85 1935 set vertically in wall at Post Office at southeast corner of College and Second Streets, in north wall 12 feet west of front entrance, between first and second windows, 3 feet above steel grating.
RM 5	620.12	USGS standard disk stamped W 85 1935 620.120 set vertically in east wall of Paintsville CSX Transport Station, 14 feet south of center of entrance to waiting room, 18.5 feet west of west rail, under dispatcher's window, approximately 2 feet above level of track.



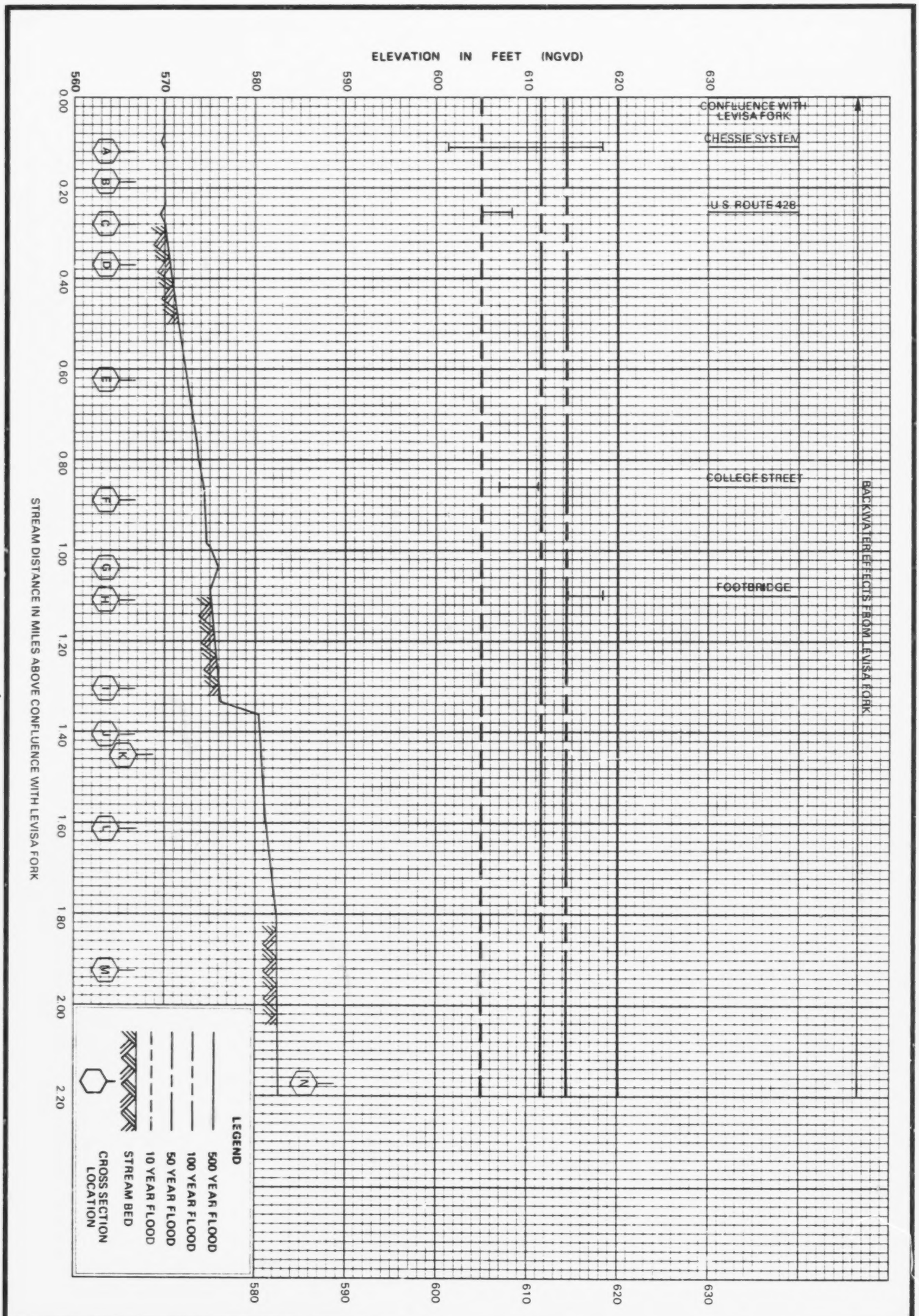
FLOOD PROFILES

LEVISA FORK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PAINTSVILLE, KY
(JOHNSON CO.)

01P



02P

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PAINTSVILLE, KY
(JOHNSON CO.)

FLOOD PROFILES

PAINT CREEK

BACKWATER EFFECTS FROM LEVISA FORK

CORPORATE LIMITS

U.S. ROUTES 23 AND 460

ELEVATION IN FEET (NGVD)

630
620
610
600
590
580

2.20 2.40 2.60 2.80 3.00

STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH LEVISA FORK

O P Q

LEGEND

- 500 YEAR FLOOD
- 100 YEAR FLOOD
- 50 YEAR FLOOD
- 10 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD PROFILES

PAINT CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PAINTSVILLE, KY
(JOHNSON CO.)

03P